

### **REMARKS/ARGUMENTS**

Applicant thanks the Examiner for his careful review of this application. Claims 1-9 and 12-20 have been rejected. Claims 10 and 11 have been objected to but is allowable if rewritten in independent form. Claim 12 has been amended. Applicant respectfully requests reconsideration of the application in view of the above amendment and the following remarks submitted in support thereof.

#### **Specification Objections:**

The Examiner objected to the specification because patent application numbers are missing. The Applicant has made appropriate corrections. Accordingly, withdrawal of this rejection is respectfully requested.

#### **Claim Objections:**

The Examiner objected to claim 12 because of a minor typographical error. Although the Applicant believes that appropriate wording is provided, the Applicant has amended claim 12 to correct the minor typographical error to more clearly define the claim. Accordingly, withdrawal of this rejection is respectfully requested.

#### **Rejections under 35 U.S.C. §103(a):**

Claims 1-9 and 12-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,271,047 to Ushio et al. in view of U.S. Publication No. 2002/0065664 to Witzgall et al. As will be fully explained below, the combination of Ushio et al. in view of Witzgall et al. does not raise a *prima facie* case of obviousness against independent claims 1, 12, and 16.

Independent claims 1, 12, and 16 define an apparatus and methods for detecting an endpoint during a chemical mechanical polishing (CMP) process. In particular, independent claim 1 and 16 define extrapolating outside spectrum data using a linear combination of values of a reflected spectrum data sample. Similarly, as amended, independent claim 12 defines logic that extrapolates spectrum data using the linear combination of the values of the reflected spectrum data sample.

In support of the obviousness rejection, the Examiner noted that Witzgall et al. teach a spectrographic analysis that can be used for endpoint detection of a CMP process (see Office Action mailed July 8, 2003 at page 3). Applicant respectfully traverses the Examiner's characterization in this regard because the portion of the reference relied upon by the Examiner (page 1, ¶ 5) does not teach extrapolating spectrum data using the linear combination of values of the reflected spectrum data sample for detecting an endpoint during the CMP process. Specifically, at page 1, ¶ 5, Witzgall et al. disclose that spectral estimation may be used in chromatographic and spectrographic analysis of materials. The measurements generated from spectral estimation "are associated with certain elements or compounds" (page 8, ¶ 96). In particular, the regression methods "are widely used in industry for determination of bulk properties or concentration of materials" (page 8, ¶ 96). Thus, in accordance to Witzgall et al., spectrographic analysis is used for determining certain properties or concentration of elements or compounds found in materials. In contrast, independent claims 1, 12, and 16 define extrapolating spectrum data using the linear combination of values of the reflected spectrum data sample for detecting an endpoint during the CMP process. Since the portion of the reference relied upon by the Examiner discloses a different use of the spectrographic analysis, Witzgall et al. cannot reasonably be considered to disclose or suggest to one having ordinary skill in the art extrapolating spectrum data using

the linear combination of values of the reflected spectrum data sample for detecting an endpoint during the CMP process as defined in independent claims 1, 12, and 16.

To establish a *prima facie* case of obviousness, the prior art references must teach or suggest all the claim limitations (see MPEP2143). Here, in view of the incorrect characterization of Witzgall et al., the references as combined do not teach all the features of the claimed invention. As such, the combination of Ushio et al. in view of Witzgall et al. does not raise a *prima facie* case of obviousness against independent claims 1, 12, and 16.

Additionally, to establish a *prima facie* case of obviousness based on a combination of references, there must be some suggestion or motivation, either in the references or in the knowledge generally available to one having ordinary skill in the art, to combine the references in the manner proposed. As will be explained below, the Examiner has not established a *prima facie* case of obviousness against the claimed subject matter because one having ordinary skill in the art would not have combined Ushio et al. and Witzgall et al. in the manner proposed by the Examiner.

In this case, the teachings of Ushio et al. focus on layer-thickness detection for semiconductor wafers in a CMP process. In contrast, the teachings of Witzgall et al. focus on signal processing in a digital signal processor. CMP processes and digital signal processors involve entirely different technologies and applications. As the teachings of Witzgall et al. have nothing to do with the problems associated with layer-thickness detection in a CMP process, Applicant submits that there would not have been any motivation for one having ordinary skill in the art to combine Ushio et al. and Witzgall et al. in the manner proposed by the Examiner.

Furthermore, Ushio et al. disclose a simplified solution to determine the thickness of a wafer layer. Essentially, in order to determine the thickness, Ushio et al. disclose a control

patterned layer with a prescribed thickness for use as a standard against which a measured spectral reflectance is compared (col. 18, lines 10-23). The rationale for using this simple solution is because:

[i]t is generally complicated to calculate the thickness of a selected patterned layer on the wafer 12 directly from the waveform of the spectral characteristic of the light reflected by the patterned layer (col. 18, lines 7-10).

Thus, Ushio et al. discourage calculating the thickness directly from the light reflected by the patterned layer because such calculations are simply too difficult. On the other hand, Witzgall et al. use complex linear prediction to directly calculate a power spectrum from a finite number of noisy measurements (p. 1, ¶ 4). In effect, Ushio et al. discourage any motivation to use complicated solutions, like the linear prediction disclosed in Witzgall et al., to calculate the thickness directly from the reflected light. As a result, Applicant submits that there would not have been any motivation for one having ordinary skill in the art to combine Ushio et al. and Witzgall et al. in the manner proposed by the Examiner.

Accordingly, for the above-stated reasons, Applicant submits that independent claims 1, 12, and 16 are patentable under 35 U.S.C. §103(a) over Ushio et al. in view of Witzgall et al. Claims 2-9, 13-15, and 17-20, each of which depends directly or indirectly from independent claims 1, 12, and 16, are likewise patentable under 35 U.S.C. §103(a) over Ushio et al. in view of Witzgall et al. for at least the same reasons set forth for independent claims 1, 12, and 16. As a result, Applicant respectfully requests the Examiner to withdraw the 35 U.S.C. §103(a) rejection for claims 1-9 and 12-20.

### **Conclusion**

In view of the foregoing, the Applicants respectfully submit that all the pending claims 1-9 and 12-20 are in condition for allowance. Accordingly, a Notice of Allowance is

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Reply to Office Action of July 8, 2003

respectfully requested. If the Examiner has any questions concerning the present Amendment, the Examiner is requested to contact the undersigned at (408) 749-6900 ext. 6924. If any additional fees are due in connection with filing this Amendment, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. LAM2P253.CIP2). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,  
MARTINE & PENILLA, L.L.P.

A handwritten signature in black ink, appearing to read "Michael K. Hsu", with a stylized flourish at the end.

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